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(54) **Loader/excavating vehicle.**

(57) A loader vehicle comprises a body (2), a ground engaging propulsion means (9,10), and a loader arm assembly (3), the loader arm assembly (3) comprising a pair of spaced booms (16) defining a space therebetween, a part of the body (33) extending into the space, at least when the loader arm assembly is in a low position, a loader implement (26) being mounted on the arm assembly (3) being extendable and retractable relative to the body (2) of the vehicle by fluid operated means (22).

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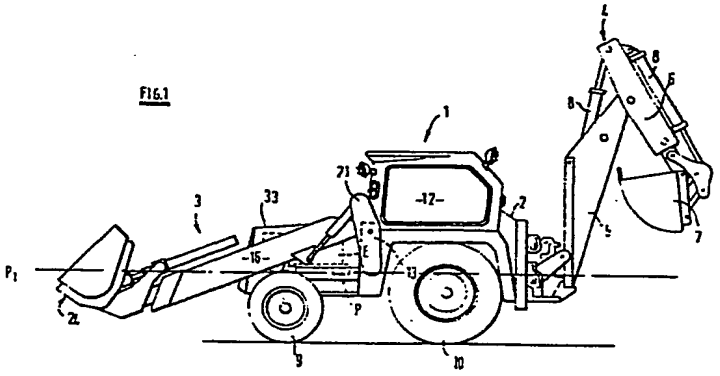
FIG.1



Title: "Loader/Excavating Vehicle"

This invention relates to a vehicle of the type comprising a body, a ground engaging propulsion means, including wheels, and/or tracks, one end of a loader arm assembly being mounted on a support part of the body and extending outwardly of one end of the body, for rotation about a first horizontal axis between a first upper position and a second lower position, the first horizontal axis being located horizontally between the axes of rotation of the wheels or between the extremities of the track whichever are provided, and located above a horizontal plane containing the upper edges of the wheels or the upper surface of the tracks nearest said one end of the body, the loader arm assembly carrying at its other end, a loader implement adapted for rotation about a second horizontal axis to enable the implement to be emptied by tipping forwards, fluid operated means being provided to pivot said loader arm assembly about said first horizontal axis, and to cause said rotation of the implement relative to the loader arm assembly about said second horizontal axis, the body having an engine or engines to drive wheels or tracks of the ground engaging propulsion means and to power said fluid operated means, the ground engaging propulsion means and the fluid operated means being controllable from an operating station.

Loader vehicles of the type described have been known for many years. However, an inherent disadvantage is that it is necessary to move the vehicle in order to load the implement. Further, the loader arms are usually relatively long in order to provide sufficient reach during loading. This causes instability when the vehicle is travelling with a loaded implement at the end of the loader arms, distant from the body.

According to the invention we provide loader vehicle of the type comprising a body, a ground engaging propulsion means, including wheels, and/or tracks, one end of a loader arm assembly being mounted on a support part of the body and extending outwardly of one end of the body, for rotation about a first horizontal axis between a first upper position and a second lower position, the first horizontal axis being located horizontally between the axes of rotation of the wheels or between the extremities of the track whichever are provided, and located above a horizontal plane containing the upper edges of the wheels or the upper surface of the tracks nearest said one end of the body, the loader arm assembly carrying at its other end, a loader implement adapted for rotation about a second horizontal axis to enable the implement to be emptied by tipping forwards, fluid operated means being provided to pivot said loader arm assembly about said first horizontal axis, and to cause said rotation of the implement relative to the loader arm assembly about said second horizontal axis, the body having an engine or engines to drive wheels or tracks of the ground engaging propulsion means and to power said fluid operated means, the ground engaging propulsion means and the fluid operated means being controllable from an operating station characterised in that the loader arm assembly comprises a pair of spaced booms defining a space therebetween, a part of the body spaced from said first horizontal axis extending into the space, at least when the arm assembly is in its second lower position, the loader implement being telescopically extendable and retractable relative to the body of the vehicle by further fluid operated means.

Hithertofore, in loader vehicles of the type described the loader implement has not been extendable or retractable relative to the body of the vehicle. The arrangement in the vehicle according to the invention has been found to provide at least the following advantages.

First, the loader implement can be filled, whilst the vehicle is stationery, by extending the implement, or even, where an excavating arm assembly is provided at the other end of the vehicle, whilst the excavating arm is in use. Secondly, the filled implement may be retracted so that the load is nearer to the centre of gravity of the vehicle thus greatly improving the stability of the vehicle when the implement is loaded, especially whilst the vehicle is travelling. Thirdly, the load can be lifted to a height greater than the retracted length of the arm assembly to facilitate for example, the emptying of the load into a lorry and/or the load can be emptied from the implement at a greater distance from the vehicle than the retracted length of the arm assembly.

Preferably, the booms of the loader arm assembly each comprise first outer and second inner telescoped members, the inner members being movable relative to the outer members by the further fluid operated means which may comprise a hydraulic ram or rams of known type comprising a cylinder and movable piston.

Preferably, one hydraulic ram is positioned within each boom, the cylinder of each ram being connected to one telescoped member and the piston of the ram being connected to the other telescoped member. However, if desired the fluid operated means may be located externally of the boom members.

The operating station may comprise an operator's cab from which each of the fluid operated means of the loader arm assembly and the ground engaging propulsion means may be controlled.

The body part of the vehicle either side of which the booms extend, may comprise a bonnet under which the engine or engines may be housed, and the loader arm

assembly, when in its first upper position, may extend above said bonnet. Alternatively however, the body part may comprise another body part such as an operator's cab, above which the loader arm assembly, when in its first upper position, does not extend.

The ground engaging propulsion means may comprise at least two pairs of wheels either providing said ground wheels, or wheels engaging and driving said tracks, and the first horizontal axis may be located longitudinally of the vehicle approximately halfway between said pairs of wheels.

Preferably, said body part which extends between said pair of booms is located substantially over one of said pairs of wheels.

The space between said booms may extend for approximately half the retracted length of the booms.

The loader implement may comprise a loading bucket or a pair of forks or any other loader implement, and the loader implement may be mounted on a mounting part which interconnects the pair of booms.

To facilitate loading and emptying of the implement, the vehicle may be provided with a self-levelling device such as described and claimed in our pending U.K. Application published under number 2,002,220A on the 12th December 1979 so that the implement may be maintained in a particular orientation relative to the ground as the loader arm assembly is moved between its upper and lower positions.

The vehicle may have a base part of an excavating arm assembly, and pivotally mounted at the other end of the body, the base part having pivoted thereto a dipper arm and an excavating tool being pivotally mounted on the dipper arm, fluid operated means being provided to raise and lower the

excavating arm assembly to pivot the dipper arm relative to the base part and to pivot the excavating tool relative to the dipper arm, such an excavating arm assembly is described in detail for example in our previous U.K. Patent 1023175. If desired, in such a vehicle, the excavating arm assembly may also be provided with a self-levelling device.

The invention will now be described in more detail by way of example, with reference to the accompanying drawings in which:

FIGURE 1 is a side view of a loader vehicle according to the invention; and

FIGURE 2 is an enlarged side view of the loader arm assembly of the vehicle of Figure 1.

Referring to the drawings, a loader/excavating vehicle 1 which embodies the invention is shown, which comprises a body 2 with a loader arm assembly 3 at the front end of the body 2 and an excavating arm assembly 4 at the rear end of the body 2.

Any other type of vehicle having a loader arm assembly may embody the invention. In the vehicle of the drawings, the excavating arm assembly 4 comprises a base part 5 pivotally mounted at one end thereof to the vehicle 1 for rotation about horizontal and vertical axes, and having a dipper arm 6 pivoted thereto at the other end.

The dipper arm 6 carries an excavating tool comprising a bucket 7.

Fluid operated means 8, comprising hydraulic rams are provided to cause relative pivotal movement of the various parts of the excavating arm assembly 4.

The body 2 of the vehicle 1 is mounted on a ground engaging propulsion means including a front pair 9 and a rear pair 10 of drive wheels. An engine E is provided beneath a bonnet 33 to provide power to the ground

engaging propulsion means and to a pump P of the fluid operated means 8 of the excavating arm assembly 4, and the fluid operated means described below, of the loader arm assembly 3.

The bonnet 33 is located substantially over the front pair of wheels 9.

The engine and the fluid operated means are each controllable from within an operator's cab 12 of the body 2.

The loader arm assembly 3 is attached to a support part 13 of the body 2 and extends from the front end thereof, the arm assembly 3 being mounted for pivotal movement about a horizontal axis 15.

The axis 15 is located horizontally approximately halfway between the axis of rotation of the wheels 9, 10 and above a plane P1 containing the uppermost edges of the front wheels 9. The loader arm assembly 3 comprises a pair of booms 16, each boom comprising a first outer boom member 17 and a second inner boom member 18 telescopically received in the outer boom member 17.

The loader arm assembly 3 may be moved between an upper position U shown in chain dotted lines in Figure 2 and a lower position D shown in full lines in Figure 2, wherein the bonnet 33 is received in a space between the booms 16, by fluid operated means comprising two pairs of hydraulic rams 19a, 19b, one ram of each pair being operatively connected to each of the booms 16.

It can be seen that the space between the booms 16 extends for approximately half the non-extended length of the boom 16.

In the vehicle shown, it can be seen that the operator's cab 12 of the vehicle 1, is located behind the loader arm assembly 3. In a different vehicle however, the operator's cab 12 may be positioned at the front of the vehicle 1. In which case, the booms 16 would extend either side of the cab 12 at least in their lower position D, the cab 12 being received in the space between the booms.

Referring again to the drawings, each of the rams 19b are pivotally connected at one end to a plate 20 attached to one of the outer boom members 17, and are pivotally connected at the other end to a plate 21 rigidly secured to the body 11 of the vehicle.

The hydraulic rams 19a, 19b are arranged to operate so that by extending or retracting the rams, the loader arm assembly 3 may be moved between its lower D position and upper U position respectively.

The second inner boom members 18 of each boom 16 are each telescopically extendable and retractable relative to the outer boom member 17 by a further fluid operated means comprising a pair of hydraulic rams 22 one located within each outer boom member 17 and both arranged to operate synchronously.

The arm assembly 3 has at its outer end 23 a loader bucket assembly 24 secured thereto, comprising a mounting part 25 rigidly interconnecting the inner boom members 18. An excavating bucket 26 is shown attached to the mounting part 25 for pivotal movement about a horizontal axis 27, although any other implement such as loading forks may alternatively be provided.

The bucket 26 may be pivoted between a first loading position L shown in full lines in Figure 2, and a second

tipping position T shown in chain dotted lines, by means of a yet further pair of hydraulic rams 28.

All of the hydraulic rams hereinbefore described are of known type, comprising a piston telescopically received within a cylinder. The pistons 31 of the rams 28 are attached to a bracket 29 of the loader bucket 26, and the cylinders 30 of the rams 28 are received in clamping formations 32 of the mounting part 25.

Thus the loader arm assembly 3 and hence the loader bucket 26 may be lifted or lowered by means of rams 19a, 19b, the loader bucket 26 extended or retracted relative to the boom 16 by means of rams 22 and tipped forwards or backwards by means of rams 28. The bucket 26 may therefore be loaded whilst the vehicle is stationary, by extending the ram 22, lifted clear of the ground, retracted relative to the body 2 for stability in transport, and emptied by tipping forwards.

Although a vehicle having a single engine E to provide power to the fluid operated means of the excavating arm assembly 4 and the loader arm assembly 3, as well as the ground engaging propulsion wheels 9, 10 has been described, if desired a plurality of engines E may be provided. Further, instead of providing the ground engaging propulsion means with wheels 9, 10, a pair of endless tracks may alternatively be provided. In this case, the tracks will be driven from drive wheels, and the plane P_1 will contain the upper edges of the drive wheels.

If desired, the associated hydraulic control circuitry of the loader arm assembly 3 and/or the excavating arm assembly 4 and the loader bucket 26 or excavating bucket 7 may be provided with a self levelling device such as described and claimed in our co-pending

application 2,022,220A which was published on the 12th December 1979.

Further, although the loader arm assembly 3 has been described as having a pair of hydraulic rams 22, one located within each boom 16, if desired the bucket 26 or other implement may be extendable or retractable relative to the body 2 by means of one or more rams located externally of the booms 16.

CLAIMS:

1. A loader vehicle of the type comprising a body (2), a ground engaging propulsion means, including wheels (9,10), and/or tracks, one end of a loader arm assembly (3) being mounted on a support part (13) of the body (2) and extending outwardly of one end of the body (2), for rotation about a first horizontal axis (15) between a first upper position (U) and a second lower position (L), the first horizontal axis (15) being located horizontally between the axes of rotation of the wheels (9,10) or between the extremities of the tracks whichever are provided, and located above a horizontal plane (P1) containing the upper edges of the wheels (9) nearest one end of the body (2) or the upper surface of the tracks, the loader arm assembly (3) carrying at its other end, a loader implement (26) adapted for rotation about a second horizontal axis (27) to enable the implement (26) to be emptied by tipping forwards, fluid operated means (19a, 19b) being provided to pivot said loader arm assembly (3) about said first horizontal axis (15), and to cause said rotation of the implement (26) relative to the loader arm assembly (3) about said second horizontal axis (27), the body (2) having an engine or engines (E) to drive the wheels (9,10) or tracks of the ground engaging propulsion means and to power said fluid operated means, the ground engaging propulsion means and the fluid operated means (19a, 19b) being controllable from an operating station (12) characterised in that the loader arm assembly (3) comprises a pair of spaced booms (16) defining a space therebetween, a part (33) of the body (2) spaced from said first horizontal axis (15) extending into the space, at least when the loader arm assembly (3) is in its second lower position (L), the loader implement (26) being telescopically extendable and retractable relative to the body (2) of the vehicle (1) by further fluid operated means (22).

2. A vehicle according to Claim 1 wherein the booms (16) of the loader arm assembly (3) each comprise first outer (17) and second inner (18) telescoped members, the inner members (18) being movable relative to the outer members (17) by the further fluid operated means (22).

3. A vehicle according to Claim 2 wherein said further fluid operated means comprise a hydraulic ram (22) or rams of known type comprising a cylinder and movable piston, one hydraulic ram (22) being positioned within each boom (16), the cylinder of each ram (22) being connected to one telescoped member (17,18) and the piston of the ram being connected to the other telescoped member (17,18).

4. A vehicle according to any one of Claims 1 to 4 wherein the operating station comprises an operator's cab (12) from which the fluid operated means (19a, 19b) and the further fluid operated means (22) of the loader arm assembly (3) and the ground engaging propulsion means are controllable.

5. A vehicle according to Claim 4 wherein the body part comprises the operator's cab (12), above which the loader arm assembly (3), when in its first upper position (U), does not extend.

6. A vehicle according to any one of Claims 1 to 4 wherein the body part of the vehicle (1) either side of which the booms (16) extend, comprises a bonnet (33) under which the engine (E) or engines is housed, the loader arm assembly (3), when in its first upper position (U), extending above said bonnet (33).

7. A vehicle according to any one of the preceding claims wherein the ground engaging propulsion means comprises at least two pairs of wheels (9,10) either

providing said ground wheels (9,10), or wheels engaging and driving said tracks, the first horizontal axis (15) being located longitudinally of the vehicle (1) approximately halfway between said pairs of wheels (9,10).

8. A vehicle according to any one of the preceding claims wherein the space between said booms (16) extends for approximately half the retracted length of the booms (16).

9. A vehicle according to any one of the preceding claims wherein the loader implement comprises a loading bucket (26) or a pair of forks, mounted on a mounting part (26) which interconnects the pair of booms (16).

10. A vehicle according to any one of the preceding claims which is provided with a self-levelling device so that the loader implement may be maintained in a particular orientation relative to the ground as the loader arm assembly is moved between its upper and lower positions.

11. A vehicle according to any one of the preceding claims wherein a base part (5) of an excavating arm assembly (4) and pivotally mounted at the other end of the body (2), the base part (5) having pivoted thereto a dipper arm (6), and an excavating tool (7) being pivotally mounted on the dipper arm (6), fluid operated means (8) being provided to raise and lower the excavating arm assembly (4) to pivot the dipper arm (6) relative to the base part (5) and to pivot the excavating tool (7) relative to the dipper arm (6).

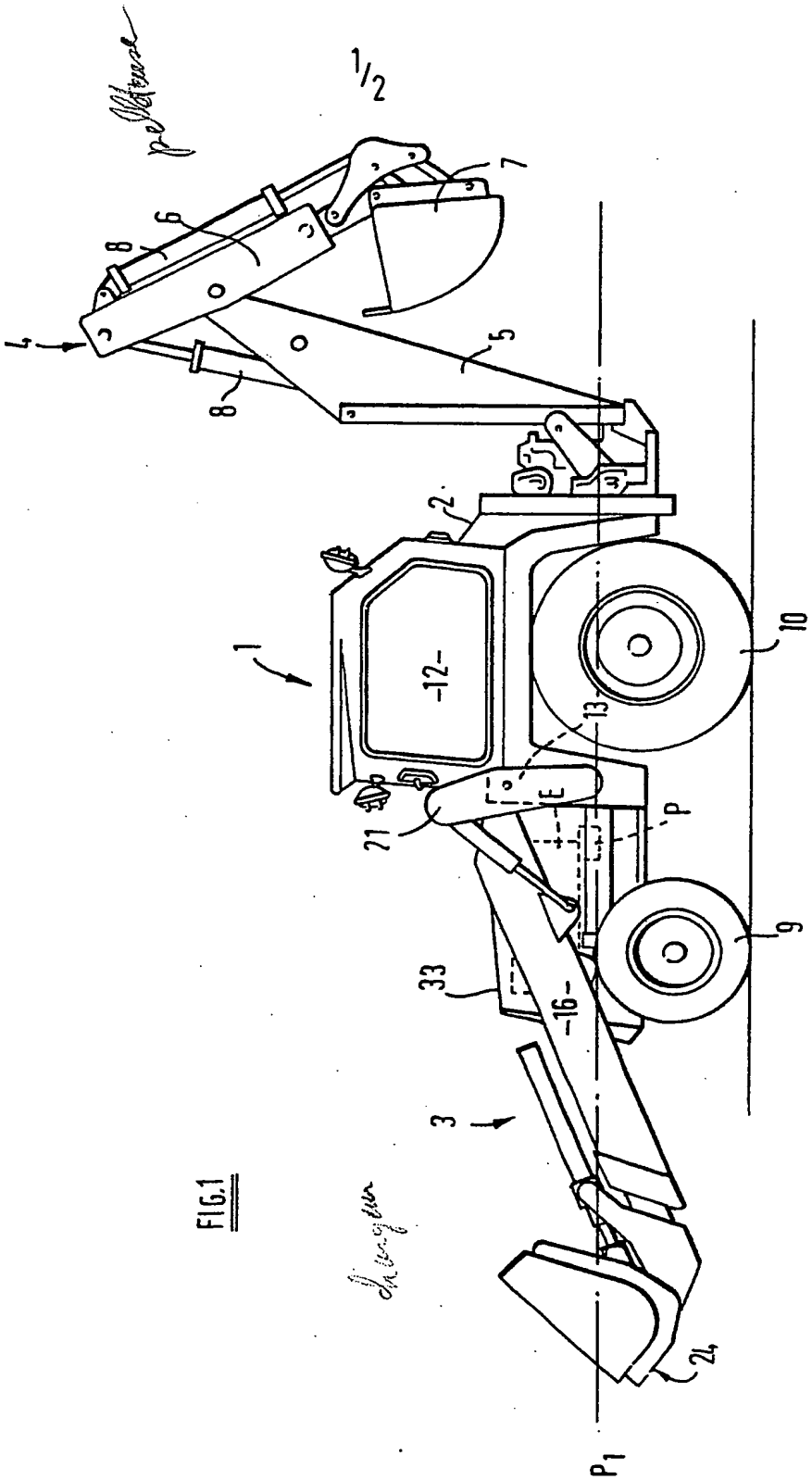


FIG.1

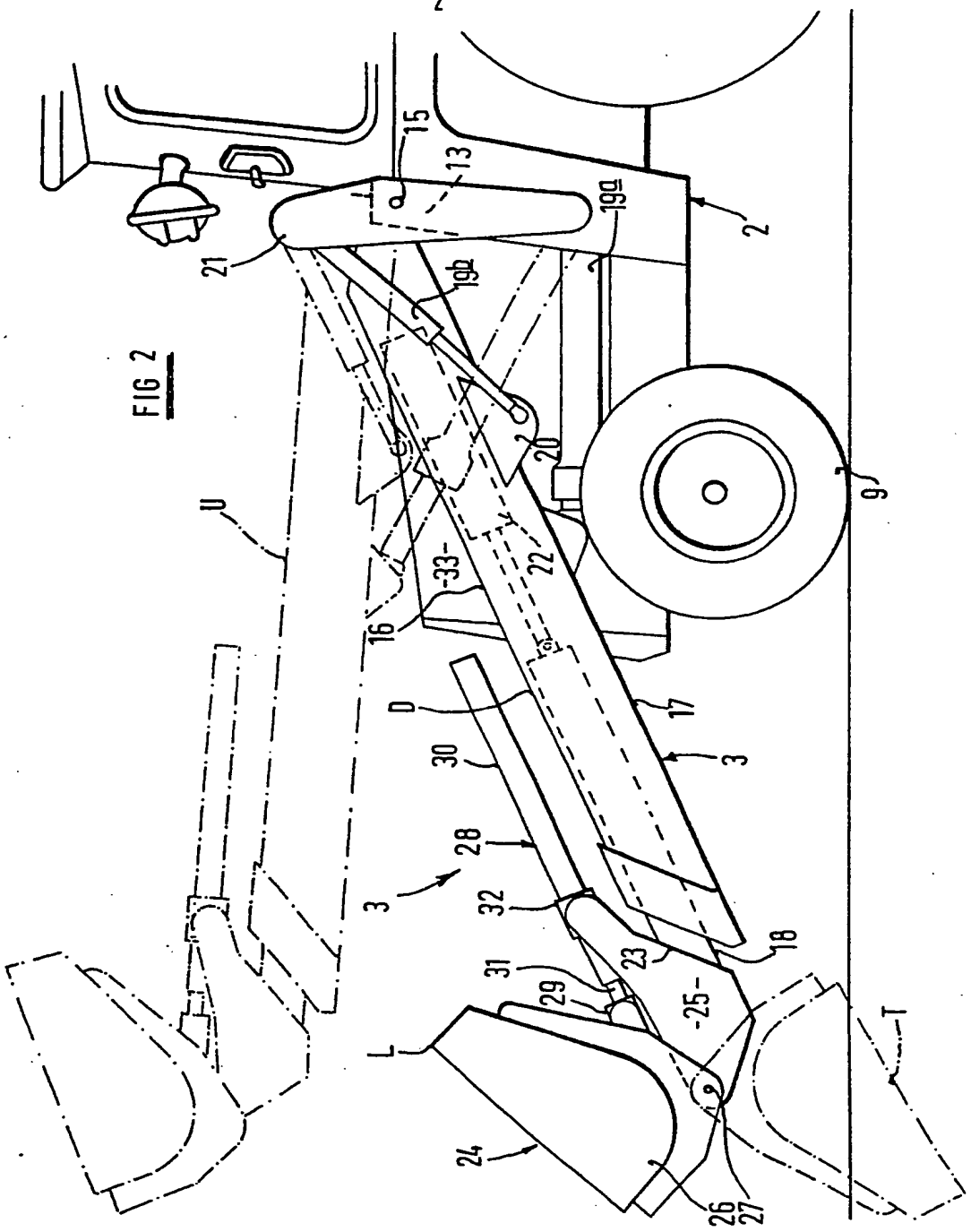

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FIG 2